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09/779,437	02/09/2001	Alfred A. Barney	01997-286001	6675

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EXAMINER
JAGAN, MIRELLYS

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 09/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/779,437	Applicant(s) BARNEY ET AL.	
	Examiner Mirellys Jagan	Art Unit 2859	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48 and 50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-48 and 50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *12* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-31, 48, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2002/0006153 to Ranson et al [hereinafter Ranson] in view of U.S. Patent 6,322,901 to Bawendi et al [hereinafter Bawendi] and U.S. Patent 5,986,272 to Britton, Jr. et al [hereinafter Britton].

Ranson discloses a method of sensing temperature utilizing:

a. a temperature sensor including a thermographic phosphor as a luminescent element,

b. a light source for illuminating the sensor, and

c. a detector that detects the light intensity emitted from the sensor,

wherein the method of sensing temperature has the following steps:

a. providing the temperature sensor including the luminescent element on a surface of a substrate, the temperature sensor being a luminescent coating,

b. irradiating a portion of the temperature sensor with an excitation wavelength of light from the light source,

c. detecting the emission of light intensity from the sensor, and

d. determining the temperature from the emission of light from the sensor (page 1, paragraph 9).

Ranson does not disclose the luminescent element being a semiconductor nanocrystal in a binder.

Bawendi discloses a fluorescent phosphor as a luminescent element comprising a semiconductor nanocrystal in a binder, which is luminescent when irradiated with an excitation wavelength of light. The luminescent element of Bawendi is a fluorescent phosphor since it is fluorescent upon excitation by a wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe surrounded by an overcoat of a second semiconductor material. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer having a polymerizable moiety that has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey solubility in order to disperse the coated nanocrystal into the chosen binder. The semiconductor nanocrystal is a member of a monodisperse core population that emits light in a spectral range of no greater than 75nm at FWHM, exhibits less than a 15% rms deviation in diameter with a particle size in the range of about 15-125 Å, and photoluminesces with a quantum efficiency of at least 10% (column 2, line 47-column 3, line 9, and column 10, line 64-column 11, line 3).

Britton teaches that it is known that fluorescent phosphors are thermographic phosphors (column 1, lines 39-45).

Referring to claims 1 and 48, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Ranson by replacing the luminescent element with the luminescent element disclosed by Bawendi, since

Britton teaches that fluorescent phosphors are thermographic phosphors, and these elements are therefore alternate types of thermographic phosphors that can be used to determine temperature.

Referring to claims 15 and 24, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the temperature sensor disclosed by Ranson by replacing the luminescent element with the luminescent element disclosed by Bawendi, since Britton teaches that fluorescent phosphors are thermographic phosphors, and these elements are therefore alternate types of thermographic phosphors that can be used to determine temperature.

Referring to claims 6, 7, and 20, the use of the particular type of polymerizable moiety claimed by applicant, i.e., a hydrolyzable moiety or a metal alkoxide, absent ant criticality, is considered to be nothing more than a choice of engineering skill, choice, or design, because the use of the particular moiety claimed by applicant considered to be the use of numerous and known alternate types of polymerizable moieties that a person having ordinary skill in the art at the time the invention was made would have been able to provide using routine experimentation in order to make the nanocrystal compatible with a chosen binder as already suggested by Ranson, Bawendi, and Britton.

3. Claims 32, 33, and 37-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,075,493 to Wickersheim in view of Bawendi, Britton, and U.S. Patent 5,233,020 to Hase et al [hereinafter Hase].

Wickersheim discloses that it is known in the art that thermographic phosphors are employed as a luminescent element in paint to create a temperature-sensing paint that is deposited on a surface to form a temperature-sensing coating (column 1, lines 53-62).

Wickersheim does not disclose the thermographic phosphor being a semiconductor nanocrystal in a binder, or the paint having a solvent as an ingredient.

Bawendi discloses a luminescent element comprising a semiconductor nanocrystal in a binder, which is luminescent when irradiated with an excitation wavelength of light. The luminescent element of Bawendi is a fluorescent phosphor since it is fluorescent upon excitation by a wavelength of light. The semiconductor nanocrystal includes a semiconductor, such as CdS, CdSe, or CdTe (which will inherently emit light independent of oxygen pressure) surrounded by an overcoat of a second semiconductor material. The nanocrystal is made by contacting a Cd donor with an S, Se, or Te donor to form a mixture and heating the mixture to form the nanocrystal. A coat of an organic or inorganic overlayer surrounds the nanocrystal, the overlayer having a polymerizable moiety that has an affinity for the nanocrystal surface and a chosen binder such as an inorganic or organic polymer. The overlayer is used to convey solubility in order to disperse the coated nanocrystal into the chosen binder. The semiconductor nanocrystal is a member of a monodisperse core population that emits light in a spectral range of no greater than 75nm at FWHM, exhibits less than a 15% rms deviation in diameter with a particle size in the range of about 15-125 Å, and photoluminesces with a quantum efficiency of at least 10%.

Britton teaches that it is known that fluorescent phosphors are thermographic phosphors.

Hase discloses that it known that paints are formed of a binder and a volatile solvent.

Referring to claim 32, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the paint disclosed by Wickersheim by replacing the luminescent element with the luminescent element disclosed by Bawendi, since Britton teaches that fluorescent phosphors are thermographic phosphors, and these elements are

therefore alternate types of thermographic phosphors that can be used in the paint to determine temperature.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the paint disclosed by Wickersheim by adding a solvent to the paint ingredients, as disclosed by Hase, since it is known that a solvent is commonly used with a binder as an ingredient in paint.

Referring to claim 39, the use of the particular type of volatile solvent claimed by applicant, i.e., an alcohol, absent ant criticality, is considered to be nothing more than a choice of engineering skill, choice, or design, because the use of the particular solvent claimed by applicant considered to be the use of numerous and known alternate types of volatile solvents that a person having ordinary skill in the art at the time the invention was made would have been able to provide using routine experimentation in order to provide a solvent that readily evaporates as already suggested by Wickersheim, Bawendi, Britton, and Hase.

Referring to claims 43-47, in manufacturing the paint disclosed by Wickersheim, Bawendi, Britton, and Hase, the method steps of claims 43-47 will inherently be followed.

4. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wickersheim, Bawendi, Britton, and Hase, as applied to claims 32, 33, and 37-47 above, and further in view of the prior art disclosed by applicant [hereinafter Prior Art].

Wickersheim, Bawendi, Britton, and Hase disclose a paint having all of the limitations of claims 34-36, as stated above in paragraph 3, except for the paint further comprising a pressure-sensitive composition that emits a light that is dependent on the oxygen pressure upon irradiation

by an excitation wavelength of light, wherein the pressure-sensitive composition includes a platinum porphyrin.

The Prior Art discloses that temperature-sensing compositions can be used in combination with pressure-sensitive compositions including a platinum porphyrin that emits a light that is dependent on the oxygen pressure. The Prior Art discloses that it is beneficial to use the two compositions in order to provide a convenient and inexpensive way to determine the pressure or temperature of a surface (page 1 of the specification).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the paint disclosed by Wickersheim, Bawendi, Britton, and Hase by adding a composition having a luminescent element that is sensitive to pressure, as disclosed by the Prior Art, in order to provide a convenient and inexpensive way to determine the pressure or temperature of a surface.

Response to Arguments

5. Applicant's arguments filed 5/22/03 have been fully considered but they are not persuasive.

Response to Arguments regarding claims 1 and 48:

Applicant's arguments that Ranson fails to disclose providing a matrix and a semiconductor nanocrystal in a binder are not persuasive since the rejections do not state that Ranson teaches a nanocrystal in a binder. The rejections state that Ranson teaches providing a thermographic phosphor as a luminescent element that is luminescent when irradiated with an excitation wavelength of light that to sense the temperature of a surface.

Applicant's arguments that Bawendi fails to disclose providing a semiconductor nanocrystal in a binder or a matrix on the surface of a substrate are not persuasive since the rejections do not state that Bawendi teaches providing a semiconductor nanocrystal in a binder on a surface of a substrate. The rejections state that Bawendi teaches that a semiconductor nanocrystal in a binder is a luminescent element when it is irradiated with an excitation wavelength of light.

Applicant's arguments that Britton fails to disclose a matrix on the surface of a substrate or a semiconductor nanocrystal in a binder are not persuasive since the rejections do not state that Britton teaches a matrix on the surface of a substrate or a semiconductor nanocrystal in a binder. The rejections state that Britton discloses that a fluorescing phosphor can also be called a thermographic phosphor.

Furthermore, referring to Applicant's arguments that the statement by Britton in column 1, lines 39-41 does not reflect the beliefs of the authors (Noel et al) of the article cited by Britton are not persuasive since the rejections are not based on the teachings or beliefs of Noel et al. The rejections are based on the teachings of Britton that a fluorescing phosphor can also be called a thermographic phosphor.

In addition, Applicant's arguments that Ranson, Bawendi, and Britton fail to disclose a matrix and a semiconductor nanocrystal in a binder are not persuasive since they appear to state that the matrix is a different element than the semiconductor nanocrystal in a binder. This is not clear since the specification discloses that the matrix is formed by the semiconductor nanocrystal in a binder (see page 2, lines 14-17 of the specification).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See ***In re McLaughlin***, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case, at the time the invention was made it was known that a luminescent element is useful for determining temperature of a surface and that a semiconductor nanocrystal in a binder functions as a luminescent element.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See ***In re Fine***, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and ***In re Jones***, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the references teach that a thermographic phosphor is used as a luminescent element for determining the temperature of a surface (Ranson), and that a semiconductor nanocrystal in a binder functions as a fluorescent phosphor (Bawendi) which are known to be thermographic phosphors (Britton). Therefore, it would have been obvious to utilize a semiconductor nanocrystal in a binder as luminescent element for determining the temperature of a surface.

Response to Arguments regarding claims 15 and 24:

Applicant's arguments that each of Ranson, Bawendi, and Britton fail to teach providing a matrix containing a semiconductor nanocrystal are not persuasive since Bawendi teaches providing a semiconductor nanocrystal in a binder (see column 2, line 47-column 3, line 9). The semiconductor nanocrystal in a binder taught by Bawendi is a 'matrix' according to the definition of 'matrix' provided by the Applicant on page 2, lines 14-17 of the specification.

Furthermore, Applicant's argument that there is no suggestion to combine the references is not persuasive for the reasons stated above with respect to claims 1 and 48.

Response to Arguments regarding claims 32, 43, and 45:

In response to Applicant's arguments that each of Wickersheim, Bawendi, Britton, and Hase fails to teach providing a semiconductor nanocrystal in a binder and a deposition solvent, or manufacturing a temperature-sensing paint or a temperature sensor that includes a semiconductor nanocrystal in a binder and a deposition solvent, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See ***In re Keller***, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); ***In re Merck & Co.***, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant's arguments that Wickersheim does not provide a motivation to use any material besides the combinations stated in column 6, lines 9-41 are not persuasive since the rejections are not based on the combinations stated in column 6, lines 9-41. The rejections are based on the teaching of Wickersheim that it is known in the prior art that that thermographic

phosphors are employed as a luminescent element in paint to create a temperature-sensing paint that is deposited on a surface to form a temperature-sensing coating (see column 1, lines 53-62).

Applicant's arguments that Wickersheim does not provide a motivation to use any material besides the combinations stated in column 6, lines 9-41 are not persuasive since the rejections are not based on the combinations stated in column 6, lines 9-41. The rejections are based on the teaching of Wickersheim that it is known in the prior art that that thermographic phosphors are employed as a luminescent element in paint to create a temperature-sensing paint that is deposited on a surface to form a temperature-sensing coating (see column 1, lines 53-62).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See ***In re Fine***, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and ***In re Jones***, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the references teach that a thermographic phosphor is used as a luminescent element in a temperature-sensitive paint for determining the temperature of a surface (Wickersheim), that a semiconductor nanocrystal in a binder functions as a fluorescent phosphor (Bawendi) which are known to be thermographic phosphors (Britton), and that a solvent is an ingredient commonly used to create paint (Hase). Therefore, it would have been obvious to utilize a semiconductor nanocrystal in a binder as the luminescent element in a temperature-sensitive paint to determine the temperature of a surface.

Response to Arguments regarding claims 34-36:

Applicant's argument that the combination of Wickersheim, Bawendi, Britton, and Hase fail to disclose a semiconductor nanocrystal in a binder and a solvent are not persuasive for the reasons stated above with respect to claims 32, 43, and 45.

Furthermore, Applicant's arguments that the Prior Art does not teach providing a semiconductor nanocrystal in a binder and a solvent are not persuasive since the rejections are not based on the Prior Art's teaching of a semiconductor nanocrystal in a binder and a solvent. The rejections are based on the teaching of the Prior Art that temperature-sensing compositions can be used in combination with pressure-sensitive compositions that include a platinum porphyrin.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 703-305-0930. The examiner can normally be reached on Mon-Thu 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 703-308-3875. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7725 for regular communications and 703-308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

mj
September 9, 2003

Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800